

REMARKS

Claims 1-4, 7-13, 16-26, and 29 were pending in this application when the present Office Action was mailed (September 6, 2006). Claims 1, 11, and 23 have been amended to correct the antecedent basis of certain features of these claims and not for any reason related to patentability. New claim 30 has been added. Accordingly, claims 1-4, 7-13, 16-26, 29, and 30 are currently pending in the application.

In the September 6 Office Action, claims 1-4, 7-13, 16-26, and 29 were rejected. More specifically, the status of this application in light of the September 6 Office Action is as follows:

(A) Claims 1, 10, and 22 stand rejected under 35 U.S.C. § 112, first paragraph, as having insufficient antecedent basis for certain features of these claims;

(B) Claims 1, 3, 4, 10, 12, 13, 16, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,243,059 to Greene et al. ("Greene") in view of U.S. Patent No. 6,677,958 to Cottone et al. ("Cottone");

(C) Claims 8, 9, 20, 21, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of Published U.S. Patent Application No. US 2004/0066515 to Ott ("Ott");

(D) Claims 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of Published U.S. Patent Application No. US 2004/0179208 to Hsu ("Hsu");

(E) Claims 7, 17, 18, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of U.S. Patent No. 4,825,201 to Watanabe et al. ("Watanabe");

(F) Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene, Cottone, and Ott, and in further view of Watanabe.

The undersigned attorney wishes to thank the Examiner for engaging in a telephone conference on January 24, 2007 to discuss the present Office Action, the Greene and Cottone references, and the pending claims. The applicants request that this paper constitute the Applicants' Interview Summary. If the Examiner notices any deficiencies with this paper in this regard, he is encouraged to contact the undersigned attorney to correct such deficiencies.

The following remarks summarize and expand upon the results of the January 24 telephone conference, and they also reflect the agreements reached between the undersigned attorney and the Examiner during the telephone conference. For example, the following remarks reflect the Examiner's acknowledgement that the Section 112 rejection of claims 1, 11, and 23 should be withdrawn.

A. Response to Section 112 Rejection of Claims 1, 10, and 22

Claims 1, 10, and 22 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking sufficient antecedent basis for certain features of these claims. During the January 24 telephone conference, the Examiner agreed that proposed amendments to claims 1, 10, and 22 would overcome the Section 112 rejection. Claims 1, 10, and 22 have been so amended and, accordingly, the Section 112 rejection of these claims should be withdrawn.

B. Response to the Section 103 Rejection of Claims 1, 3, 4, 10, 12, 13, 16, and 29

Claims 1, 3, 4, 10, 12, 13, 16, and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene in view of Cottone. The undersigned attorney thanks the Examiner for providing a detailed explanation of his position regarding the Greene and Cottone references during the January 24 telephone conference. As set forth in detail below, Greene and Cottone cannot support a Section 103 rejection of claims 1, 3-6, 10, 11, 13-15, 18, 22, 23, and 30 for at least the reason that these references, either alone or in combination, fail to teach or suggest all the claimed features.

1. Independent Claim 1 is Directed to a Method for Calibrating a Visual Display Module Including *Inter Alia*, Locating and Registering Multiple Subpixels of the Sign, Determining Chromaticity and Luminance Values for each Registered Subpixel, Converting the Chromaticity and Luminance

Values for Each Subpixel to Tristimulus Values, and Calculating
Correction Factors for Each Registered Subpixel

Independent claim 1 is directed to a method for calibrating a visual display module. The method includes analyzing a visual display module having an array of pixels and corresponding subpixels and locating and registering multiple subpixels from the visual display. The method then includes determining a chromaticity value and a luminance value for each registered subpixel and converting the chromaticity values and luminance values to measured tristimulus values. The method further includes converting a target chromaticity value and a target luminance value for a given color to target tristimulus values. The method then includes calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values and sending the correction factors to the visual display module.

2. The Applied Art

In the Office Action, the pending claims were rejected based on the assertion that it would have been obvious to combine Greene's color correction methods with Cottone's method for calibrating a flat panel visual display.

a. Greene Discloses a Method and Apparatus for Correcting
Spatial Non-Uniformities in Color of Visual Displays

Greene is directed to a method and apparatus for correcting spatial non-uniformities in the color of electronic, flat panel displays caused by variations in materials, manufacturing, and/or operational parameters. Referring to Figure 10 of Greene, this reference discloses an apparatus 32 for testing and calibrating a visual display 34. The apparatus 32 includes an arm 33 with a colorimeter head 35 mounted on the arm 33. The colorimeter head 35 can move in the x- and y-direction to a variety of different positions relative to the display (as shown by arrows 36 and 38). During testing, selected pixels of the display 34 can be turned on and the colorimeter head 35 can be positioned over the corresponding pixels to scan and measure the color elements and other characteristics of the respective pixels. Color correction parameters can then be computed and stored in a memory of the display 34. (Greene, col. 17, lns. 18-33.)

Greene discloses correcting the variations between chromaticity and luminance between adjacent pixels so that the remaining variation between the adjacent pixels will be below a detection threshold of a human observer. (Greene, col. 10, Ins. 35-37.) Greene further discloses that "the chromaticity threshold applies only to adjacent pixels, or to two adjacent groups of pixels having a sharp boundary. For more distant pixels or groups of pixels, gradual luminance variations as large as 10 to 20% may be permissible." (Greene, col. 10, Ins. 26-30; emphasis added.) Greene further adds that "an accurate solution is not needed, because the corrections need to reduce chromaticity and luminance nonuniformities only below the detection threshold for the average observer." (Greene, col. 15, Ins. 64-66; emphasis added.)

b. Cottone Discloses a Method of Calibrating a Flat Panel Display

Cottone is directed to a method of calibrating a flat panel video display, such as an Organic Light Emitting Diode (OLED) display. The method of Cottone includes three components: (1) calibrating the flat panel display to a desired white point, (2) characterizing the flat panel display for chromaticity and luminance, and (3) providing an image processing path for driving the display. (Cottone, col. 3, Ins. 24-28.) More specifically, Cottone's method includes providing a flat panel OLED display having an overall and individual adjustment for both gain and offset. The method then includes displaying a first target using a low level code value for each channel, sensing the luminance level of the first target, and adjusting the gain of the display so that the sensed luminance level matches a first predetermined aim value representing a luminance level at least three decades lower than a maximum luminance level. (Cottone, col. 1, Ins. 54-65 and Figure 2.) The method further includes displaying (a) a second target using intermediate code values for each channel of the display device, and (b) a third target using maximum code values for each channel of the display device. The luminance and chromaticities of the displayed second and third targets are sensed and compared with a second aim value and a third aim value, respectively. The individual channel gains and offsets are then adjusted so that the luminance level matches the corresponding second and predetermined aim values and the chromaticities match a first set of predetermined chromaticities. (Cottone, col. 1, ln.66

to col. 2, ln. 18, and Figure 2.) Cottone discloses that this process is repeated until all three aim values are achieved. (Cottone, col. 4, lns. 30-31.)

3. Greene and Cottone fail to Support a *Prima Facie* Case for Rejecting Claim 1 Under Section 103 Because, *Inter Alia*, These References Teach Away from the Claimed Method and There is no Teaching, Suggestion, or Motivation to Combine the References

Greene and Cottone fail to support a *prima facie* case for rejecting claim 1 under Section 103 because, *inter alia*, these references teach away from the claimed method and, furthermore, there is no teaching, suggestion, or motivation to combine these two references. As discussed above, the method of claim 1 includes (a) determining a chromaticity and a luminance value for each registered subpixel, (b) converting the chromaticity and luminance value for each registered subpixel to measured tristimulus values, and (c) calculating correction factors for each registered subpixel based on a difference between the measured tristimulus values and target tristimulus values for a given color. Neither Greene nor Cottone teach or suggest these features. Indeed, the Office Action concedes that Greene "does not teach converting the chromaticity and luminance value for each registered subpixel value to tristimulus value[s] in step (d)" and that Greene further fails to teach "converting a target chromaticity value and a target luminance value for a given color to tristimulus values in step (e)." (Office Action, p. 4.) To cure this deficiency, the Office Action relies on Cottone. More specifically, the Office Action asserts that "it would have been obvious . . . to convert the [Greene's] chromaticity and luminance values into tristimulus values as taught by Cottone . . . so as to increase the precision of color/brightness values." (Id.) For the reasons explained below, however, it would not have been obvious to modify Greene's method in light of the teachings of Cottone.

The MPEP states that "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the reference[s] themselves or in the knowledge generally available to one of ordinary skill in the art." (MPEP § 2143.01; emphasis added.) The MPEP further states that the mere fact that a reference can be modified does not render the resultant combination

obvious "unless the prior art also suggests the desirability of the combination." (Id.; emphasis added.) Here, the prior art does not suggest the desirability of modifying Greene's method to include converting the chromaticity and luminance values for each pixel to measured tristimulus values or calculating correction factors based on a difference between the measured tristimulus values and the target tristimulus values for a given color.

For example, as discussed above, Greene specifically discloses that the adjustments or corrections made to various pixels or groups of pixels of a flat panel video display are made to match uniformity requirements of the average human observer. Greene further discloses that such adjustments may not be consistent and pixels in one portion of the display may have luminance values that vary as much as 10-20% from luminance values in another portion of the display. In fact, as mentioned previously, Greene specifically discloses that "an accurate solution is not needed, because the corrections need to reduce the chromaticity and luminance nonuniformities only below the detection threshold for the average observer." (Greene, col. 15, Ins. 63-67; emphasis added.) At best, therefore, Greene discloses that the pixels of a display are adjusted so that they are generally uniform and there are no large differences between adjacent pixels. Nowhere does Greene disclose or suggest the claimed method that requires calculating correction factors for each registered subpixel of the display based on a difference between the measured tristimulus values and the target tristimulus values for a given color. Rather, Greene's pixels are only corrected to be consistent with the immediately adjacent pixels, and are not each corrected based on a single target value for a given color.

Moreover, Cottone fails to cure the above-noted deficiencies of Greene. For example, as discussed previously, Cottone is directed to capturing a number of images from an OLED display with the display set to various code values (e.g., low, intermediate, and maximum levels). Nowhere does Cottone disclose or suggest calculating correction factors for each pixel of a display. Instead, based on the undersigned attorney's review of this reference, it appears that Cottone's measurements capture the spectral output of the entire display using a spectral radiometer, and without locating or registering any individual pixels within the OLED display.

In fact, not only do the references fail to provide a motivation to combine the features disclosed therein in the manner suggested in the Office Action, but the references teach away from the features of claim 1. For example, as mentioned above, Greene specifically discloses that "an accurate solution is not needed." In fact, Greene's disclosure goes into considerable detail about various methods that can be used to speed up the calculation process since precision is not necessary. (see, e.g., Greene, col. 15, ln. 63 to col. 17, ln. 9.) For example, Greene discloses that "fast approximate techniques, including adaptive, neural network, or fuzzy logic-type solutions are possible." (Greene, col. 15, ln. 67 to col. 16, ln. 2.) Greene's disclosure teaches various shortcuts that can be used to speed up the calculations since the new values don't have to be precise—they just have to be "below the detection threshold for the average observer." Moreover, based on the undersigned's reading of Greene, such precision is outside the scope of Greene and would be far too time-consuming and intensive in light of Greene's teachings. Cottone fails to cure the above-noted deficiencies of Greene. Rather, Cottone appears to only be used herein to support the use of tristimulus values. As outlined above, however, Greene teaches directly away from such additional calculations because they could increase the time required for processing and provide a much higher level of accuracy than is needed in Greene's method. Thus, a person of skill in the art would not be motivated to modify Greene's method in light of Cottone to come up with the claimed combination of elements. Therefore, the Section 103 rejection of claim 1 should be withdrawn.

Claims 3, 4, 10, and 29 depend from base claim 1. Accordingly, Greene and Cottone cannot support a Section 103 rejection of claims 3, 4, 10, and 29 for at least the reason that these references cannot support a Section 103 rejection of base claim 1, and for the additional features of these dependent claims. Therefore, the Section 103 rejection of dependent claims 3, 4, 10, and 29 should be withdrawn.

Independent claim 10 includes several features generally similar to claim 1 (e.g., converting the chromaticity values and luminance values for the registered subpixels to measured tristimulus values, calculating corrections factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values for a given color). Accordingly, this claim is allowable over the applied

references for at least the reasons discussed above with respect to claim 1, and for the additional features of this independent claim. Therefore, the Section 103 rejection of claim 10 should be withdrawn.

Claims 12, 13, and 16 depend from base claim 10. Accordingly, Greene and Cottone cannot support a Section 103 rejection of claims 12, 13, and 16 for at least the reason that these references cannot support a Section 103 rejection of corresponding base claim 10, and for the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 12, 13, and 16 should be withdrawn.

C. Response to the Section 103 Rejection of Claims 8, 9, 20, 21, and 22

Claims 8, 9, 20, 21, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of Ott. Claims 8 and 9 depend from base claim 1 and claims 20 and 21 depend from base claim 10. Ott fails to cure the above-noted deficiencies of Greene and Cottone to support a rejection of claims 1 and 10. Accordingly, dependent claims 8, 9, 20, and 21 are allowable over Greene, Cottone, and Ott for at least the reasons explained above, and also because of the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 8, 9, 20, and 21 should be withdrawn.

Independent claim 22 includes several features generally similar to claim 1 (e.g., converting the chromaticity values and luminance values for the registered subpixels to measured tristimulus values, calculating corrections factors for each registered subpixel based on a difference between the measured tristimulus values and the target tristimulus values for a given color). Accordingly, this claim is allowable over the applied references for at least the reasons discussed above with respect to claim 1, and for the additional features of this independent claim. Therefore, the Section 103 rejection of claim 22 should be withdrawn.

D. Response to the Section 103 Rejection of Claims 23 and 24

Claims 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of Hsu. Claims 23 and 24 depend from base claim 22. Hsu fails to cure the above-noted deficiencies of Greene and Cottone to

support a rejection of claim 22. Accordingly, dependent claims 23 and 24 are allowable over Greene, Cottone, and Hsu for at least the reasons explained above, and also because of the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 23 and 24 should be withdrawn.

E. Response to the Section 103 Rejection of Claims 7, 17, 18, and 19

Claims 7, 17, 18, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene and Cottone, and in further view of Watanabe. Claim 7 depends from base claim 1, and claims 17, 18, and 19 depend from base claim 10. Watanabe fails to cure the above-noted deficiencies of Greene and Cottone to support a rejection of claims 1 and 10. Accordingly, dependent claims 7, 17, 18, and 19 are allowable over Greene, Cottone, and Watanabe for at least the reasons explained above, and also because of the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 7, 17, 18, and 19 should be withdrawn.

F. Response to the Section 103 Rejection of Claims 25 and 26

Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Greene, Cottone, and Ott, and in further view of Watanabe. Claims 25 and 26 depend from base claim 22. Watanabe fails to cure the above-noted deficiencies of Greene, Cottone, and Ott to support a rejection of claim 22. Accordingly, dependent claims 25 and 26 are allowable over Greene, Cottone, Ott, and Watanabe for at least the reasons explained above, and also because of the additional features of these dependent claims. Therefore, the Section 103 rejection of claims 25 and 26 should be withdrawn.

G. New Claim 30

New claim 30 has been added to the present application. The subject matter of this claim is supported by the figures and the text of the original application (see, e.g., paragraphs [0035]-[00048] and Figure 7). Therefore, this claim does not add any new matter to the application and is fully supported under Section 112, paragraph one.


Conclusion

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the applied art. The applicant respectfully requests reconsideration of the application and a mailing of a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned at (206) 359-3982.

Respectfully submitted,

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